

Survival Analysis: Objective Assessment of Wait Time in HCI

Summary[1]

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1 Introduction

The majority of people have witnessed a loading screen in some visual or auditory form. The progress bar gives users an idea of how long they must wait before they can continue working. However, a problem arises when the visual component is lacking. How can the user have a "progress bar" as an auditory medium? This is a challenge that the researchers have faced for a long time. To tackle this issue, the paper delves deeper into the calls received on the *women in distress helpline* (181) and notes the time after a user abandons the call and performs a survival analysis.

1.1 Historical Context

Previous research shows that the acceptable waiting time for systems with no visual representations is 10 seconds. By providing the user feedback on the waiting time the usability of the system can be increased and progress bars are the dominant temporal metaphor used dominantly. Telling people how long they must wait can distort their perception of time, making it seem to pass more slowly. Not providing them a queue time may make them end the call, so there is a need to find a balance between the two.

2 What is the problem that is being solved?

The paper evaluates temporal metaphors (visual progress bar, auditory progress bar, speech waiting cues etc.) objectively and tries to answer the question "For what time duration can the proposed temporal metaphor hold users, on average". The proposed temporal metaphor is an auditory progress bar.

2.1 Women Distress Helpline

Since the experiment is of a sensitive nature as the calls can range from counselling to serious offences, it was noticed that 95% of the people abandoned the calls before 100 seconds. Therefore, the goal is to **minimize the number of abandoned calls**, which

is possible by increasing the number of agents at the call centre (which is not possible) or making the callers wait for a bit longer.

2.2 Problem on a larger scale

Inefficient utilisation of the waiting time may reduce the usability of the system. Additionally, the allocation of more human resources is much more difficult. Therefore, there is a need to solve this issue not only in the case of helplines but wherever there is a waiting time and a lack of visual representations.

3 What methods have been used to collect and analyze the data?

As the data needs to be handled with extra caution, appropriate permissions were obtained from the helpline authorities, and ethical measures were taken. Moreover, only the delay message was changed and no call recording was accessed.

3.1 Data Collection

The data was collected for a period of 1 month. Information like caller ID, queue time, call status etc. was collected for about 8000 calls. Since the analysis is on the calls which received at least one delay announcement (i.e. a caller who had to wait ≥ 16 seconds), a huge number of calls (≤ 16 seconds) were removed which left the **total** number of calls to 1353. Some people called multiple times, so the total number of **unique calls** was 1082.

3.2 Baseline System

It repeatedly plays a welcome message "*Welcome to the Chief Minister's Women Helpline*", in Hindi. The user is left wondering how long they'll have to wait, which may make the sensitive situation worse.

3.3 Proposed Auditory Progress Bar System

It initially announces a 300-second waiting time and then makes 12 announcements each after 25 seconds. This is a great way of making the user wait as:

1. The user knows how long they'll have to wait before someone answers their call.
2. Previously, the user decided to disconnect almost instantly, this way, without increasing the number of agents, more calls can be answered.

The duration of 300 seconds was chosen so that a user never actually (the probability that the user has to wait is 0.001) has to wait for the announced time. The choice of the 25-second interval, whenever the focus of the user is towards time gives the perception

that time is moving very slowly and intervals greater than 30 seconds may push the user to hang the call up.

3.4 Performance

The metrics that have been measured are the abandon rate, probability estimation, size of effect and statistical significance. I have listed the performance for both the total calls (1353) and unique calls (1082) below.

3.4.1 Total Calls

1. The difference between the abandon rate of the baseline system and the APB system was 3%, with the APB system having a 61% (approx) abandon rate, the lower, the better.
2. The probability that the callers will wait on the APB system for more than 100 seconds is also greater by quite a margin (evident from Figure 3a).
3. There is a gap of 13 seconds between the systems with the APB system performing much better and having a higher survival time.
4. Further, statistics (logrank) were calculated however the difference wasn't significant. The reason could be the number of repeated calls, but the difference wasn't much.

3.4.2 Unique Calls

The performance between the APB and baseline systems grew further apart for unique calls or first calls.

1. There was a gap of 7% between the abandon rates of the APB and the baseline systems.
2. A similar pattern is noticed for the probability that the person would wait more than 100 seconds, i.e. the APB system performing much better (evident from Figure 3b).
3. There is a gap of 20 seconds between the systems with the APB system performing much better and having a higher survival time.
4. The logrank test for the first calls was quite significant.

4 What can be (could have been) done to enhance the work?

1. One of the limitations that I noticed and is mentioned in the paper itself, is that the majority of the callers on the 181 helpline would be women from Delhi, and this may not represent the broader population accurately. The experiment could

be repeated in other demographics to collect more data and analyze it on a bigger scale. The change in demographics might also represent that the people are more patient.

2. Although there is quite a small difference between the calls received on the baseline system and the APB system (approximately 100 calls), it would have been better if the number of calls was equal or the gap was smaller. We might get different results if the calls are almost the same. As 100 calls like a small number, however, when we look at the number of unique calls that is 1082, it is almost 10% and the difference between the baseline and APB system was 7% (abandon rate).

References

- [1] SINGH, P., ASTHANA, S., AND GUPTA, P. Survival analysis: Objective assessment of wait time in hci.